

Journal of Criminal Law and Criminology

Volume 43 | Issue 5

Article 10

1953

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Recommended Citation

Richard Ford, Critical Times in Murder Investigation (Time of Assault, Incapacitation, and Death), 43 J. Crim. L. Criminology & Police Sci. 672 (1952-1953)

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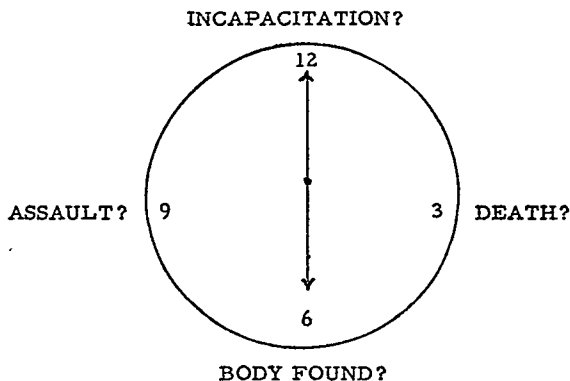
CRITICAL TIMES IN MURDER INVESTIGATION

(Time of Assault, Incapacitation, and Death)

Richard Ford

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No problem in homicide investigation is more difficult than determining the times when significant events occurred. The medical investigator who crouches beside a body, feels the skin, and announces that death occurred two hours and fifteen minutes ago is either simple-minded or pompous and seriously imperils the success of the police investigation of the case. Time of death is ordinarily thought to be of great importance in murder. It is significant but only as a point of reference for the chief event, Time of Assault, and the next most significant Time of Incapacitation.



The interval between any two of the four times indicated on the diagram above may vary from a few seconds to many months or years. It may be argued that at least five minutes of absent oxygen supply to the brain is required to kill a man and that various tissues of the body live for hours after the total man is dead, yet when a railroad train severs a head from its body, for all practical purposes the victim is instantly dead. Similarly, on the blast of a shotgun, those in the vicinity who rush toward the sound find the victim with the brains blown from his skull. Here the intervals Assault to Incapacitation, Incapacitation to Death, Death to Body Found, and the total interval Assault to Body Found, are only a few seconds. Only Macbeth had trouble with

this sequence when he complained about the apparition of Banquo "There was a time when the brains were out a man was dead."

There are at least four matters of grave importance for the prosecution of homicide or solution of the case that hinges on the four times:

1. Were the wounds immediately incapacitating?
2. Was the assault a continuing one even after death with the element of cruel and unusual violence?
3. Was the decedent injured in a known fracas?
4. Who could have committed the assault and who could not?

The first three are entirely concerned with the ante-mortem period and the last with both ante- and post-mortem intervals.

Speed of Incapacitation. Very few wounds are immediately and totally incapacitating. Multiple ruptures of viscera and fractures from falls from heights and impacts by speeding vehicles, decapitation, injuries to the lower brain and upper spinal cord, and bursting injuries of the heart are among the most rapid. Opinions as to what was done by a victim following the severest of wounds must be rendered with reservations. Sir Sidney Smith's classic case of the Scottish attorney began when the housekeeper of the dead lawyer summoned police. She had heard her employer having difficulty with his key in the front door lock. He being abstemious, this was unusual, and she opened the door. He strode past her, took off his coat and hat and hung them up, and without a word went upstairs and locked himself in the bathroom. She called to him, knocked, and got no answer. The police broke in and found him dead on the floor with a gunshot entrance beneath his chin and exit on the top of his head. No gun! Through a light fall of snow they back tracked his foot-prints to a summer house in the garden where his gun lay on the bench and where a bullet hole was present in the roof. He had removed his hat, shot himself through the head, replaced the hat, walked to the house, taken out his keys, and done all that the housekeeper described before collapsing.

Recently, a young husband, separated from his wife, met her in the company of another man. He whipped out a knife and attacked, stabbing her once in the left chest. She remained standing, screamed, and was helped to walk to an ambulance. Following five days of precautionary bed rest she was allowed bathroom privileges. On her first return trip she dropped dead. The knife had penetrated through the front wall of her heart, through the septum dividing the right and left heart, and through a portion of the aortic valve leaving on the surface of the

heart a self-sealing wound. The first mild exertion caused her heart to fail. Here was a wound usually incapacitating within five minutes with five days of survival.

The body of a four-year-old child was found in the dark corner of a barn with a gunshot wound of entrance in the front of his neck. A 22-calibre rifle from the nearby house was leaning against the outside wall 30 feet away. A simple story seemingly, the youngster, reared on television, had taken the forbidden weapon for play. A tragic accident! Perhaps it was, but the bullet that caused his death severed his spinal cord high in the neck. He could not have moved a muscle from his jaw to his toes from the moment the bullet struck him, and the gun is far away.

Incapacitation to Death. The interval between incapacitation and death may be immediate or very long. The degree of organic damage, the amount of blood loss, the development of bacterial infection, and the absence of competent medical care may each contribute to a delayed or even unnecessary death. Injury to the skull with extensive fragmentation of bone is a frequent cause of delay between an incapacitating injury and death. It seems paradoxical that shattering of the skull may allow a longer survival than the small round hole drilled by a bullet. The answer is that injury to the brain usually causes swelling within the bony cage of the skull and interferes with the flow of blood in the brain whereas breaking the rigid skull permits the swelling brain to expand without compression of the blood vessels.

Appraisal of the duration of life after an assault, includes such observations as length of beard growth assuming the victim reasonably clean shaven when assaulted. Desiccation of the face permits the beard to protrude; water-soaked swollen skin conceals the short hairs and the face appears clean shaven. The extent of digestion of food and the position of a meal in the intestine should be considered. Fear and injury will arrest digestion. The degree of distention of the urinary bladder may offer some slight help, subject of course to the variables of kidney shut-down due to blood loss and spontaneous emptying of bladder. More precise, but still requiring the utmost conservatism in interpretation, is the extent of reaction of body tissues to injury. The extent to which hemorrhage has worked through tissues is a rough guide to duration of bleeding subject to the kind and extent of vessels injured. Inflammation, the process of removal of damaged tissue by pus cells, and subsequent scarring is a valuable guide. In man, pus cells probably do not pass into tissues in appreciable numbers under three hours. However, the nature of foreign material forced in and the

extent of crushing of tissue may alter the degree of reaction. A sequence of different kinds of pus cells appears over a period of days with some predictability. The formation of new capillary blood vessels and early scar tissue should be manifest in three days and extensive in a week. All of these have been used to good effect.

A young woman left her place of employment for lunch. On the crowded sidewalk a rejected suitor approached her and fired two shots. Two bullets were present in her body. One, a contact shot in her back ripped her heart into shreds; the other, a distant shot shattered her right shin. Which was fired first? Along the missile tract into her back there was extensive bleeding into the tissues. No blood oozed from the leg, only marrow fat soaked the mesh of her nylon stocking. Here is irrefutable evidence that he shot her dead from behind and then as she lay on the ground fired again some seconds later. The bursting of the heart dropped her blood pressure to zero, and the second wound could not bleed.

A deranged husband killed his wife. She was manually strangled, stabbed, and her skull was shattered by a hammer. On the right rear of her head was a ring of depressed but unseparated bone, the first blow when her head was free to yield before the hammer. The forehead was crushed with plates of bone driven in as the skull was further hammered against the unyielding floor. To stop her hoarse gasping breath, he crushed her throat leaving bruises in the muscles and a fractured hyoid bone. In her left chest three stab wounds penetrated lung but without blood staining of the tissues, clearly post-mortem wounds. His unemotional confession confirmed the circumstantial evidence. Between the strangling and the stabbing he went down to a tavern for a beer.

Seven years ago, Dr. Alan R. Moritz unravelled a fantastic series of events. A school girl was lured into a vacant dwelling as she was returning home from an errand. Defenceless as a result of blows on the head she was mutilated over a period of two days with a knife left plunged in her body. Microscopic examination of the degree of reaction of her tissues to the series of injuries showed the varying ages of her wounds. Absence of bleeding proved some post-mortem. Missing for three days, her body was not decomposed; her package, hamburger, was wholly spoiled. Thus, immediate incapacitation, continuing sadistic violence, a long Incapacitation to Death interval, post-mortem injuries, and a short Death to Body Found interval completely documented by medical and environmental evidence.

Occasionally a fracas is known to have occurred, but the victim is

spirited away. A tavern brawl was reported to police who arrived to find only one dazed, intoxicated man who had not run. He failed to sober properly in his cell and was hospitalized. Five days later he was found to have meningitis, and in two more days he was dead. Only then was found the small scab in the hair of his left temple where the ice-pick had entered to skewer his brain.

The freshly dead body of a man was dumped at the door of a hospital. He had a single bullet wound that passed through liver and stomach and tip of the eleventh rib. A crude incision showed that the bullet was removed by an amateur. Nine days before, a series of gunshots was fired in a hotel lobby. Was this the victim? The entrance wound and incision were scabbed, the edges puckered, and obscured with powder. An overwhelming peritonitis resulted from the stomach leaking gastric juices, but the liver was nearly healed, seven to ten days old. Though shooting and death were in different cities the age of the wound was the link.

The Post-Mortem Interval. The interval between Death and Body Found is determined by the *association* method which relates the death to concurrent events or by the *rate* method, the changes in the dead body. Examples of the association method are numerous and have included the last time the watchman punched the time clock, the failure of a woman to walk the dog, non-appearance of a commuter on the evening train, room lights on in day time, window shades left down, nature of the last meal in the stomach, failure to take in newspapers, mail, and milk, bullets stopping clocks, shattered watches, and even the amount of rain water in the shoe of a raped girl. The presence or absence of foot-prints in a fresh fall of snow or rain-soaked soil are known to all and are precise.

Less precise and requiring true expert appraisal is the rate method. No one man can encompass the necessary knowledge to evaluate all the post-mortem phenomena in every case. The medicolegal pathologist can do the most. Body temperature after death falls on the average at the rate: $\frac{98.6 - \text{rectal temperature}}{1.5} = \text{hours}$. If the body is in bed covered with blankets the rate will be slow; if nude on ice in the winter wind the rate will be rapid like the quick freezing of food. If the victim was shot in the head, death may occur with a fever of 108°F. One body in a bed, shot through the head fourteen hours earlier was warmer than the pathologist who performed the autopsy! Degenerative changes in the body concern the death of tissues, bacterial action, and putrefaction. Rigor mortis is the stiffening of muscles after death probably due

to acid changes. Ordinarily it begins a few hours after death in the jaw, moves downward to the feet, and disappears first in the jaw until wholly gone in 24 to 36 hours. However, it may never appear, be complete in a few hours, or never appear in the upper body. The bile in the gall bladder stains the adjacent liver in 3 to 12 hours, or it may not. Fecal material in the large bowel discolors the abdomen green in 3 to 12 hours, forming iron sulfide in the tissues, or it may not. The outer layer of skin loosens and soft blisters form in about 12 hours. Bacteria from the intestines penetrate into the blood vessels on the death of bowel tissue and generate gas which circulates slowly throughout the body in about 12 hours. Post-mortem lividity, the purple color of the lower portions of a dead body may appear in 30 minutes and intensify to a maximum in four hours. If death is due to a slowly failing circulation, it will be prompt; if massive hemorrhage occurs, it may not appear. As time passes a body bloats, blackens, liquifies or forms soap-like apipocere, dries, and finally the bones dry and after years demineralize and pulverize. Every change and the rate of change is governed by bacteria, insects, and the body's own enzymes, all operating by chemical processes governed by the rule of thumb—that for every ten-degree rise in temperature the speed of a chemical reaction is doubled! The entomologist can help. Maggots and maggot cases removed from a cadaver may tell the number of days or weeks that have elapsed. Ultimately beetles may gauge the months. The anthropologist can estimate the age of bones. Collapse of the eyeballs and drying of a body in a cold environment may be the only aid to estimation of time of death.

On the bottom of an icy pond a body may lie many months without drying or major putrefactive change. Although it is commonly believed that a drowned body rises and floats after a specific interval, it may rise immediately supported by excess body fat, air trapped in clothing, gas in the intestines, or a combination of these and anatomic peculiarities. Ordinarily, gas formed by putrefaction causes floating, but it is obvious that a small amount of gas will raise a nearly buoyant mass while a weighted body requires more gas and more time.

Environmental changes are a part of the rate method: The degree of drying of blood and excreta, spoilage of food, and the destruction and regrowth of foliage beneath a body. The putrefactive juices will arrest the growth of weeds and shrubs beneath a cadaver preventing regrowth till rain and sun sweeten the ground. The botanist can state the month the plants were killed; he can age the roots and bushes growing through the bones.

Assault to Body Found. In order to reach the chief concern, time of assault, therefore, it is necessary that the ante-mortem interval and the post-mortem interval, be each appraised and added. Only in this way can the danger of incriminating the innocent and excluding the guilty be avoided.

The body of a woman was sprawled on its back in the flat of a man she was to marry. Deep cuts on her head and neck from a sharp heavy instrument and one circular bruise indicated that a carpenter's hatchet had been used. Autopsy of the body showed only moderate staining of the liver by bile as evidence of post-mortem change. No putrefaction was present, and with reasonable latitude testimony was given in lower court that death occurred between four and twelve hours before her body was found. The defendant was known to be out of the state for twenty-four hours preceding discovery of the body. If the ante-mortem interval between Assault and Death were ignored, he had an iron-clad alibi. However, on the floor surrounding her head there was a thick pool of blood which had contracted, dried, split, and hardened like red-lacquered wood. The gashes in her scalp were densely invaded by pus cells without scar tissue or new blood vessels. Blood could not dry to that extent in twelve hours, and the degree of inflammation of tissues suggested injury a day old. Subsequently, he confessed that he struck her thirty-one hours before she was found. It then became clear that she lay unconscious but living for about 24 hours and dead about 7 hours.

To incriminate the innocent is a double injustice. The wrong man suffers, and the guilty gets away. A chief petty officer called the hotel physician. His "wife" was dead. She had hired the room the preceding afternoon, and he had joined her that night. Bruises were present on her body; no disorder in the room. At autopsy, she was found to have a bruised scalp and pressing on the brain a huge subdural blood clot that was firm and stuck fast to the overlying dural membrane, about 48 hours old. The ship's log showed his whereabouts and the ante-mortem interval proved that he could not have caused her fatal injury.

Summary. Seek out therefore a competent pathologist experienced in homicide investigation and the effects of injury for a cautious opinion as to duration of the post-mortem period plus the ante-mortem period to arrive at the all-important Time of Assault. No single observation is precise; many variable factors known and unknown can alter by minutes, hours, days, weeks, months, or years the estimated times of critical events.